



Littoral Fishes Response, Upper Lake Marion, SC, Following Triploid Grass Carp Hydrilla Control

PURPOSE: This technical note summarizes a 7-year study that was conducted to investigate the effects of hydrilla control by triploid grass carp on fishes in upper Lake Marion, South Carolina.

BACKGROUND: Hydrilla (*Hydrilla verticillata*) became established in upper Lake Marion during the early 1980s and, by 1988, had colonized over 4,000 hectares. In 1989, triploid grass carp (*Ctenopharyngodon idella*) were stocked into upper Lake Marion to control hydrilla. By 1994, almost 600,000 fish had been released into the Santee Cooper system (Lakes Marion and Moultrie and the connecting canal). Extensive surface coverage of hydrilla persisted through 1991, began to decline in 1992, and was reduced to less than 60 hectares in upper Lake Marion by 1994.

As part of the study reported herein, fish in upper Lake Marion were sampled for 7 years to evaluate the effects of decreasing hydrilla coverage on fish abundance. A boat-mounted electroshocker was used to quantify relative abundance and species composition of fishes at 10 permanent locations distributed throughout the upper lake (Figure 1).

FISH COMMUNITY: A total of 16,306 fish representing 64 species were collected in the 176 (15-min) electroshocking samples. The taxonomically dominant family was Centrarchidae (sunfishes), comprising 15 species and accounting for 22 percent of the total number of fish collected. The numerically dominant family was Clupeidae (shad), comprising 5 species and accounting for 37 percent of the total number of fish collected. Other common families included Cyprinidae (minnows) and Catostomidae (suckers).

Dominant species (≥ 4 percent), in decreasing order of abundance, were threadfin shad (*Dorosoma petenense*), golden shiner (*Notemigonus crysoleucas*), gizzard shad (*Dorosoma cepedianum*), largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), eastern silvery minnow (*Hybognathus regius*), blueback herring (*Alosa aestivalis*), redear sunfish (*Lepomis microlophus*), and inland silverside (*Menidia beryllina*).

COMPARISON OF FISH ABUNDANCE BETWEEN HIGH AND LOW HYDRILLA COVERAGE: The number of species collected during high (1989-1992) and low (1993-1994) hydrilla coverage was similar (51 and 50 species, respectively). However, mean catch of all species combined significantly increased during low hydrilla coverage (Figure 2). Littoral and pelagic fishes showed similar results. Frequently collected littoral species (>0.8 percent of total catch) that increased significantly after hydrilla declined included bowfin (*Amia calva*), golden shiner, lake chubsucker (*Erimyzon sucetta*), bluegill, redear sunfish, largemouth bass, and yellow perch (*Perca flavescens*) (Figure 3). Mean catch of coastal shiner (*Notropis petersoni*) and black-spotted sunfish (*Lepomis punctatus*) also increased significantly during low hydrilla

19990601 094

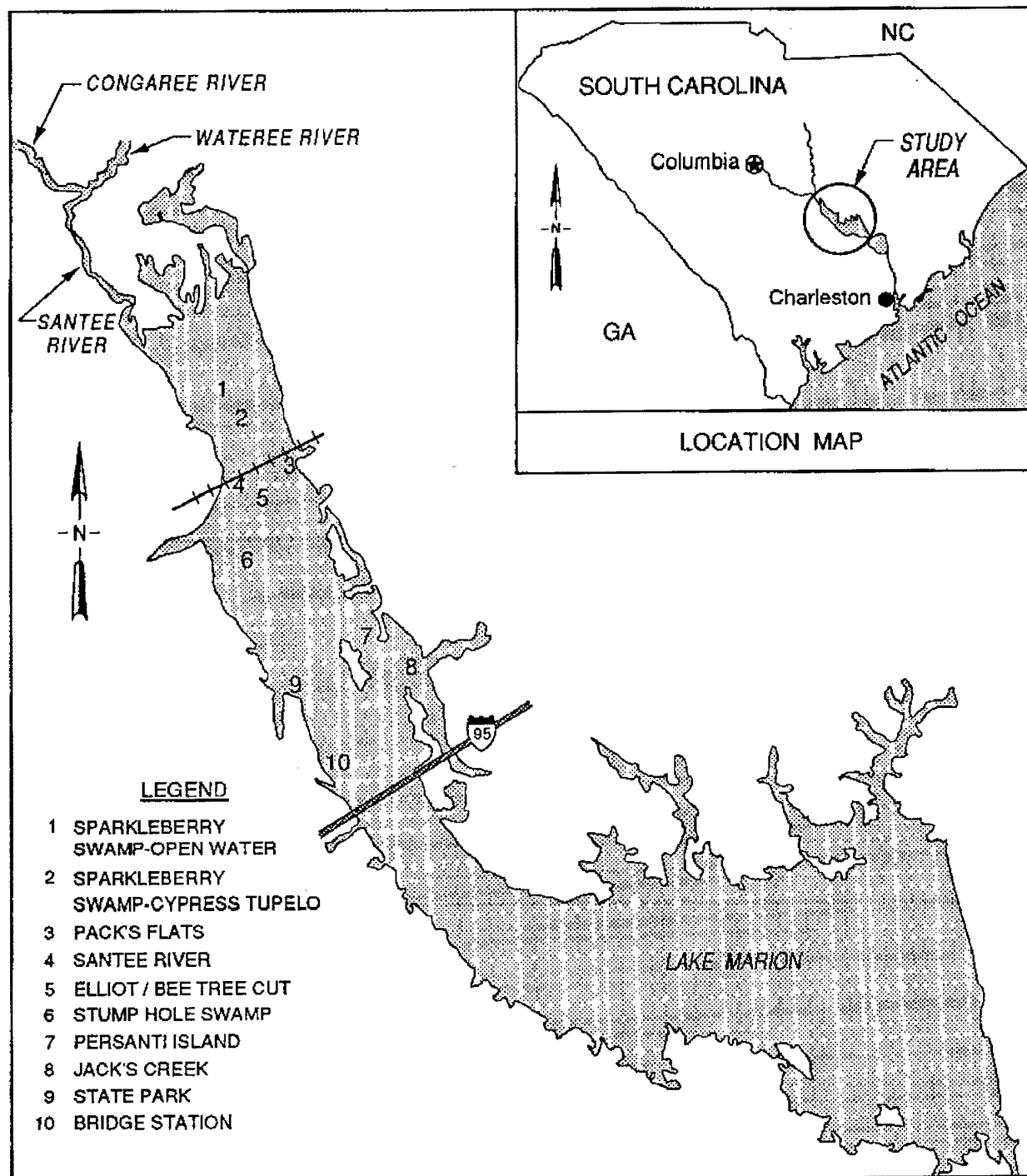


Figure 1. Study area sampling locations, upper Lake Marion, South Carolina

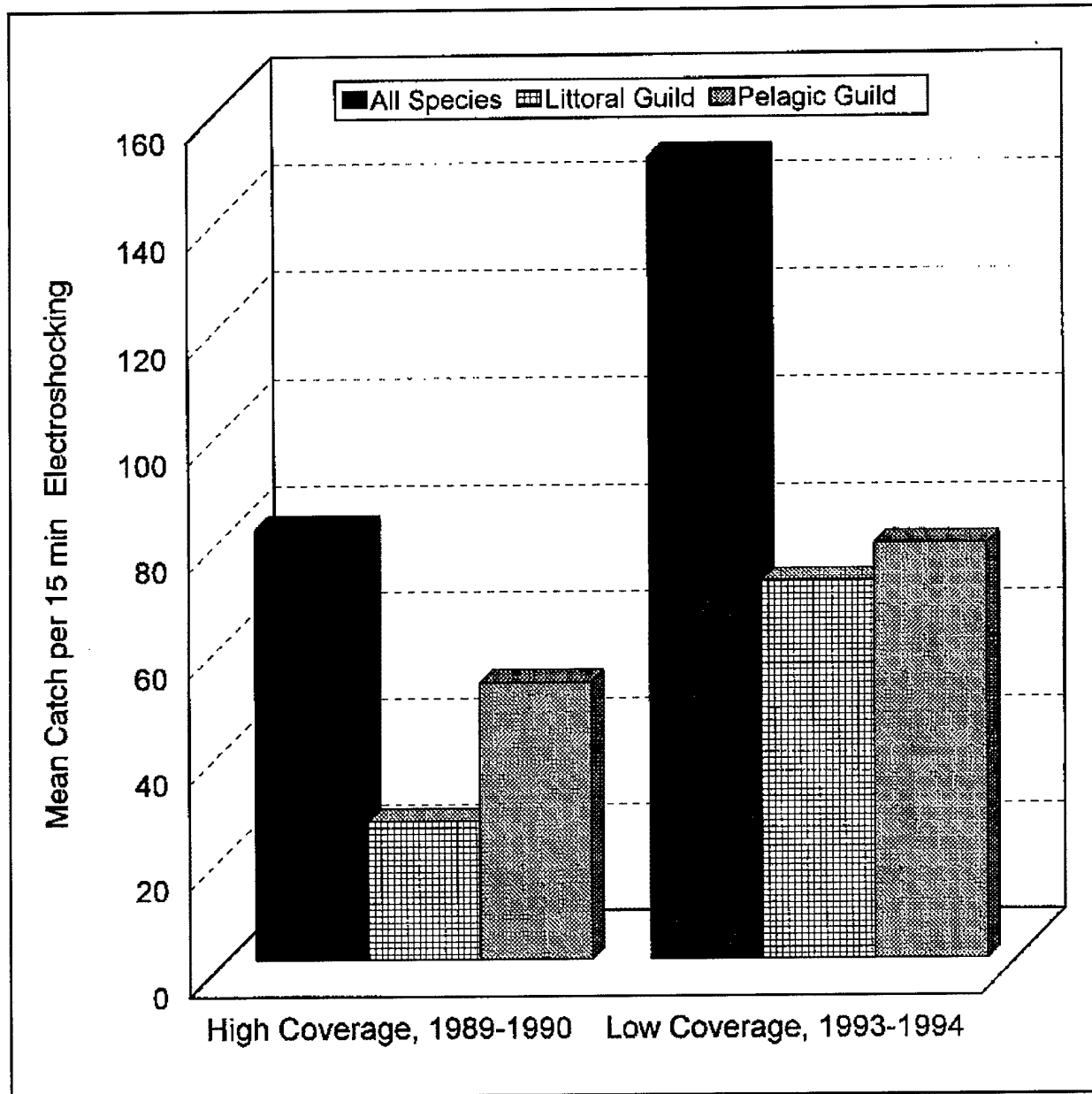


Figure 2. Fish abundance, for all species combined and by guild, during periods of high versus low hydrilla coverage

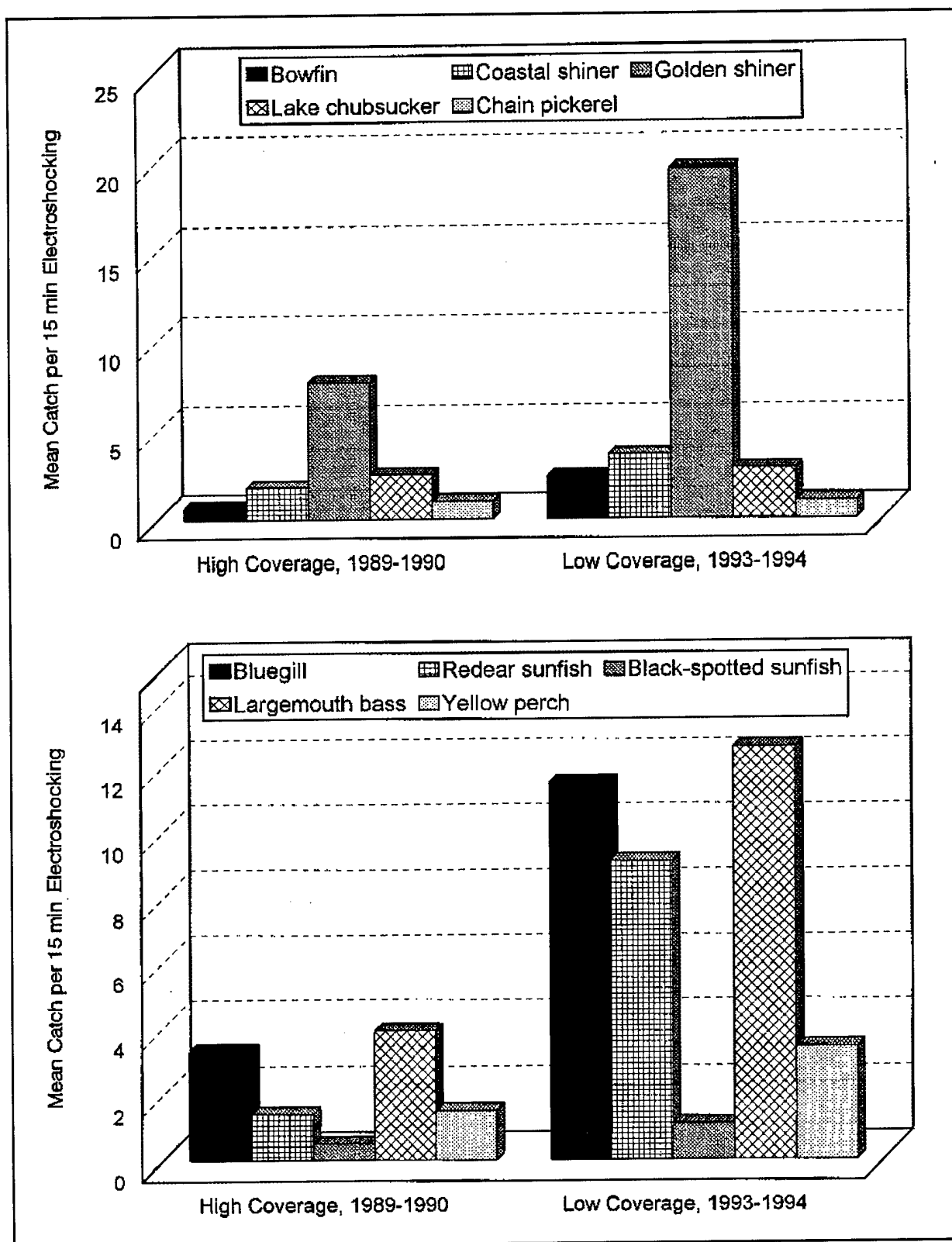


Figure 3. Fish abundance, for individual species, during periods of high versus low hydrilla coverage

coverage, but to a lesser degree. There was no significant difference in mean catch of chain pickerel (*E. niger*) between the two time periods.

CONCLUSIONS: Grass carp reduced the surface coverage of hydrilla in upper Lake Marion from approximately 50 percent to less than 10 percent, while abundant structure near the shoreline (in the form of standing timber, subsurface submersed vegetation, and floating and emergent species) remained. Thus, the underwater landscape of upper Lake Marion was shifted from monospecific stands of hydrilla to intermediate levels of structural complexity. Consequently, grass carp effectively controlled hydrilla and resulted in no detectable negative effects on the fish assemblage during the study.

POINTS OF CONTACT: For additional information contact the authors, Dr. K. Jack Killgore, (601) 634-3397, killgok@mail.wes.army.mil, and Dr. J. P. Kirk, (601) 634-3060, kirkj@mail.wes.army.mil, or the manager of the Aquatic Plant Control Research Program, Dr. John W. Barko, (601) 634-3654, barkoj@mail.wes.army.mil. This technical note should be cited as follows:

U.S. Army Engineer Waterways Experiment Station. (1998). "Littoral Fishes Response, Upper Lake Marion, SC, Following Triploid Grass Carp Hydrilla Control," Aquatic Plant Control Technical Note MI-01, Vicksburg, MS.

NOTE: *The contents of this technical note are not to be used for advertising, publication, or promotional purposes. Citation of trade names does not constitute an official endorsement or approval of the use of such products.*